

# “Agile Methodology – Past and Future”

Warren W. Tignor  
SAIC

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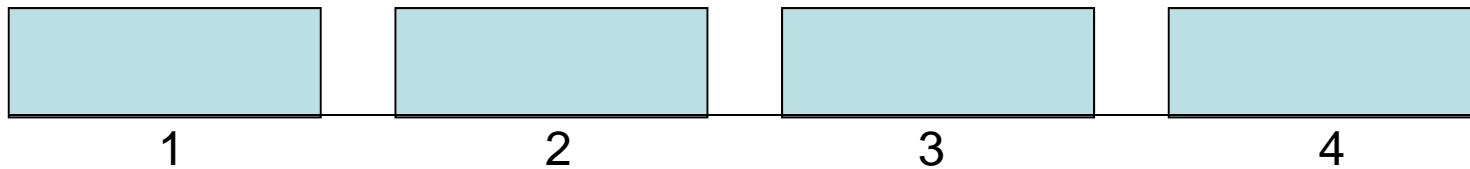


# The New Development Game

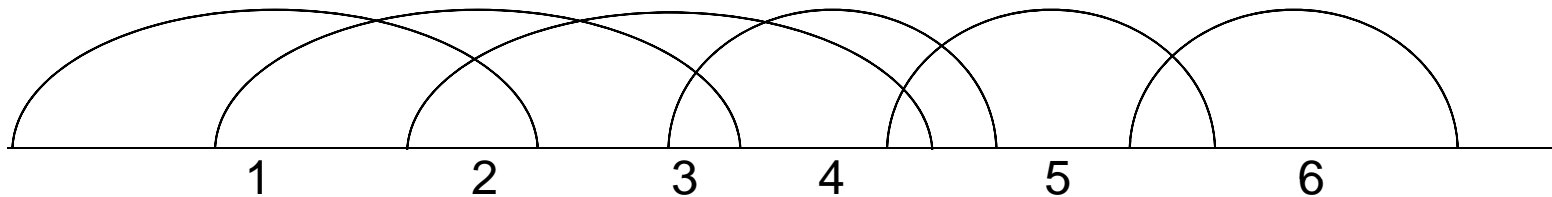
Hiroataka Takeuchi & Ikujiro Nonaka published

- "The New New Product Development Game" HBR Jan-Feb (1986)
- Holistic approach with six characteristics:
  - Built-in instability
  - Self-organizing project teams
  - Overlapping development phases
  - "Multilearning"
  - Subtle control &
  - Organizational transfer of learning

# Examples of New Product Development Types \*



**Linear** - Waterfall-like Product Phases



**Overlapping** - Agile-like Product Phases

\* Adapted from Takeuchi & Nonaka HBR 1986, p139

# RUGBY

## Waterfall-Red vs. Agile-Black Team



# Manifesto 2001

## Manifesto for Agile Software Development

We are uncovering better ways of developing software by doing it and helping others do it.  
Through this work we have come to value:

Through this work we have come to value:

**Individuals and interactions** over processes and tools

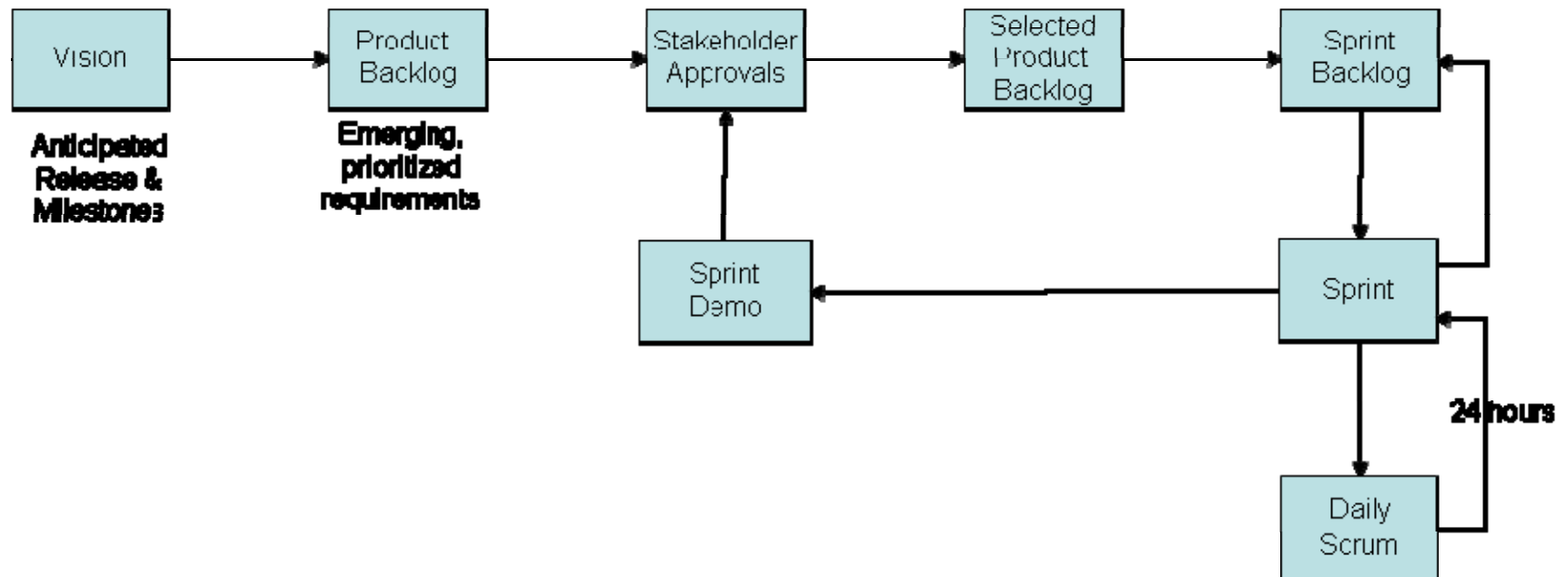
**Working software** over comprehensive documentation

**Customer collaboration** over contract negotiation

**Responding to change** over following a plan

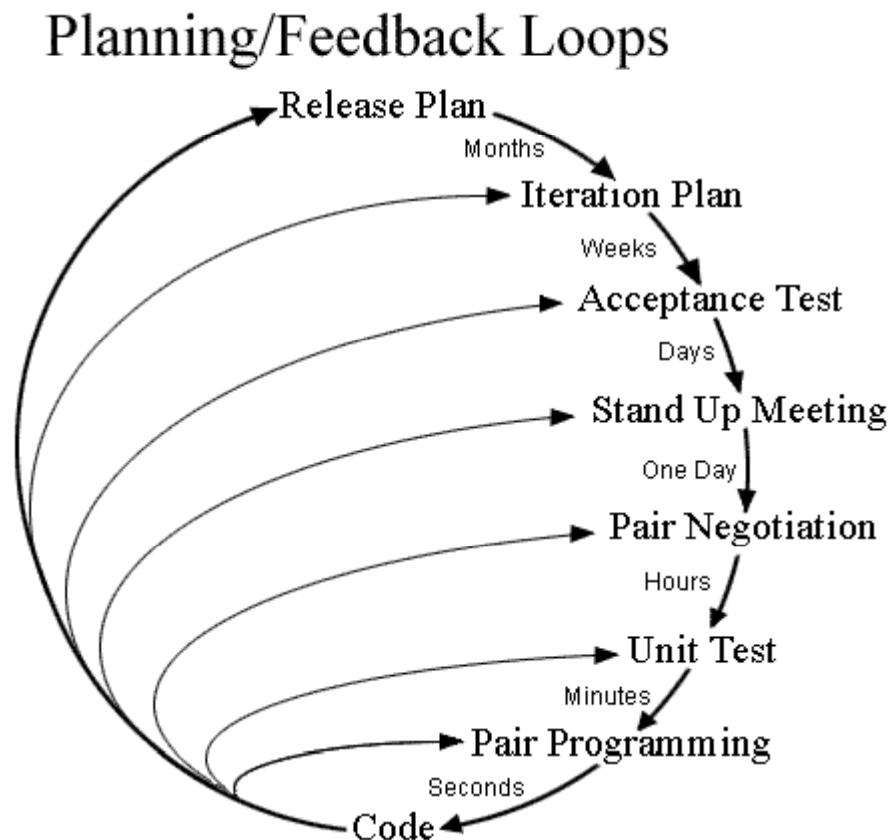
That is, while there is value in the items on the right, we value the items on the left more.

# SCRUM GRAPHIC\*



\* Adapted from Schwaber (2007)

# Agile Extreme Programming (XP)

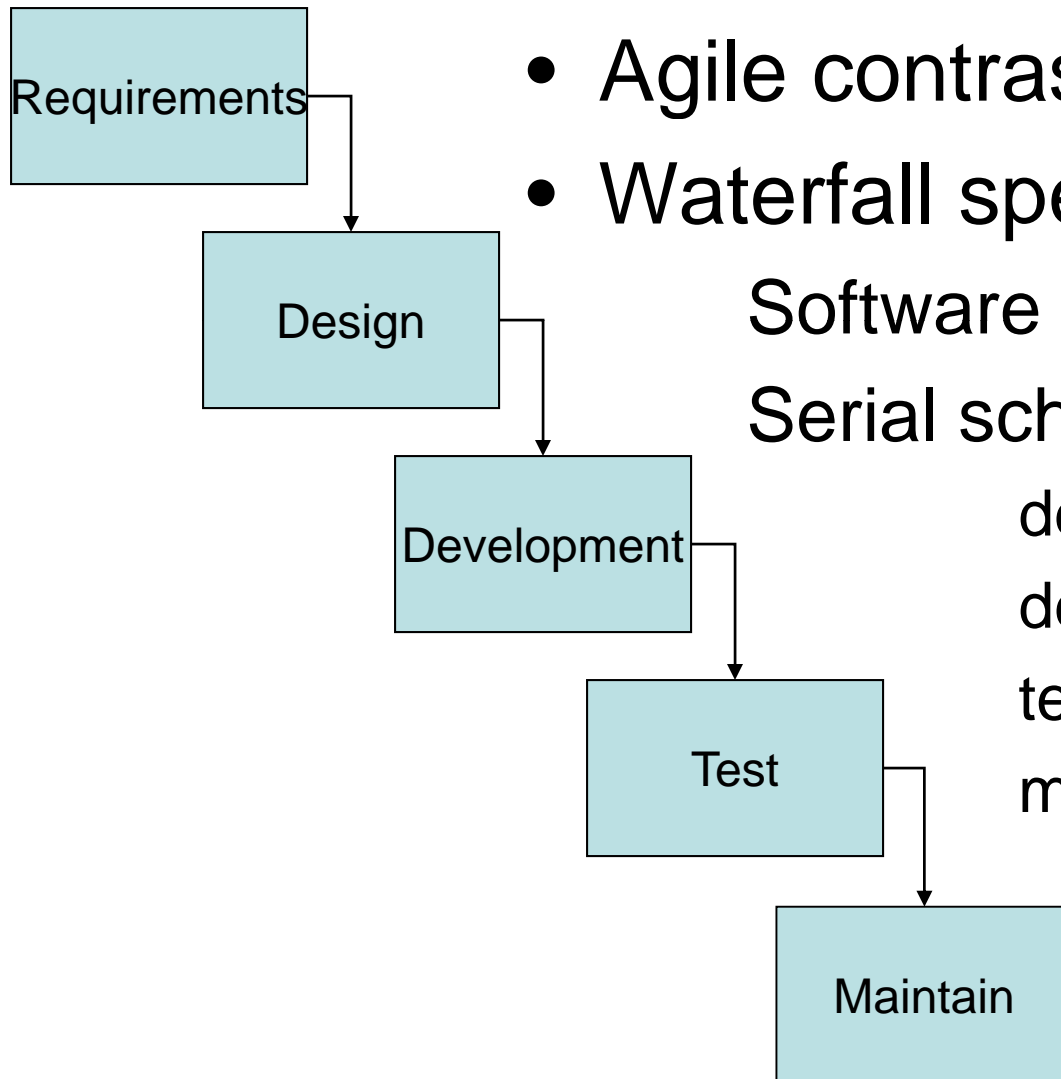


**Attributed** to Don Wells (<http://en.wikipedia.org/wiki/File:XP-feedback.gif>) without endorsement of me or my use of the work.

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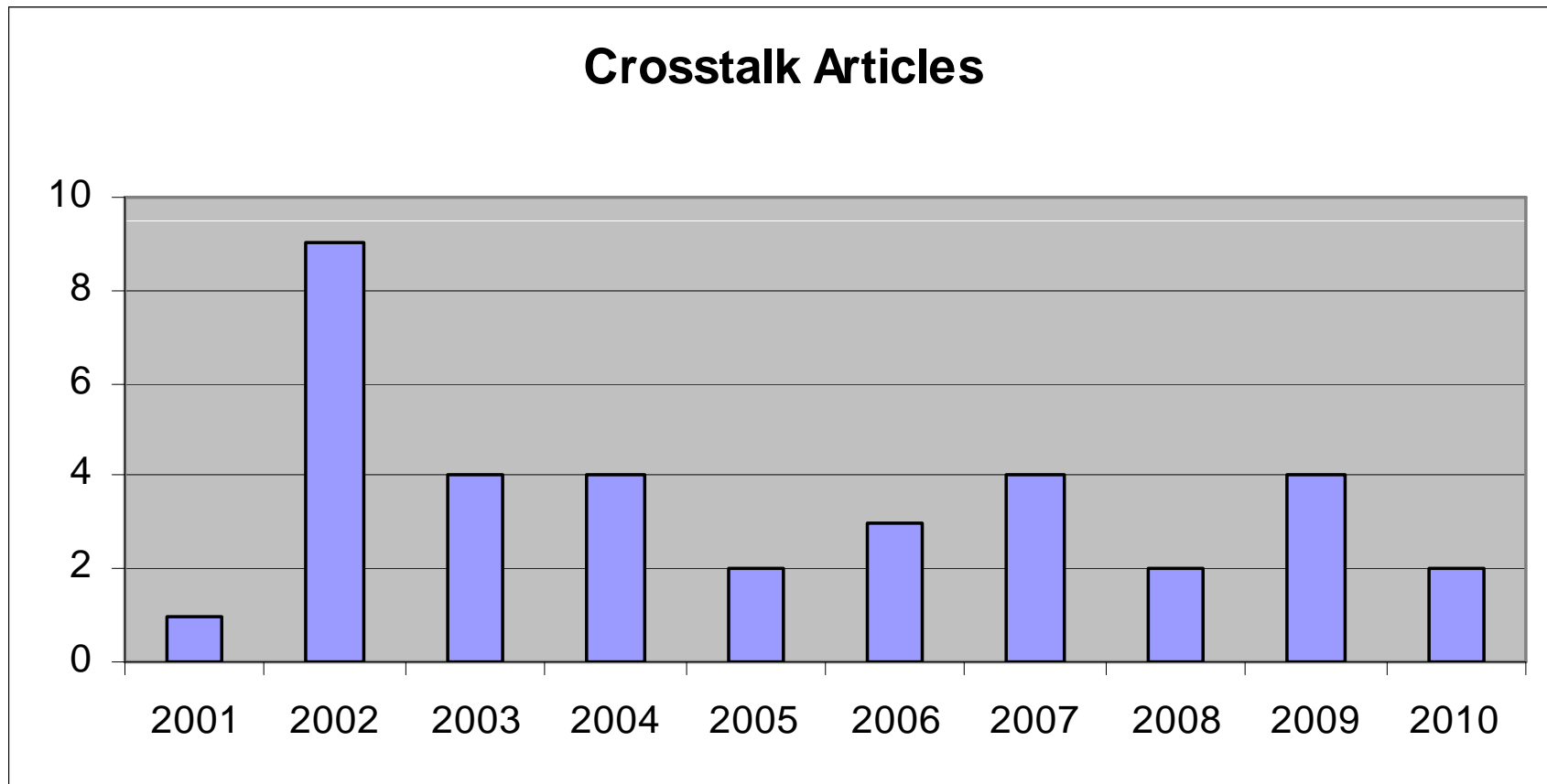


# Waterfall



- Agile contrasts with Waterfall
- Waterfall specifies up-front  
Software to be developed  
Serial schedule of events, e.g.,  
design,  
develop,  
test, &  
maintain.

# CROSSTALK Articles Reflect Agile's DoD Emergence





# Agile & CMM® Process

- Glazer (2001/11) investigated the Agile (XP) and CMM® Myth/Reality/Bridge
- Kane & Ornburn (2002/10) declared Agile is not a return to days of cowboy programmer



## Agile & CMM® Process

- Paulk (2002/10) noted Agile advocated many good engineering practices - some controversial and counterproductive
- McCabe and Polen (2002/10) questioned how could bad things continue to happen to good programs where CMM® was applied - implying maybe Agile might help



# Agile & CMM® Process

- Highsmith (2002/10) wrote Agile & CMM®/CMMI<sup>sm</sup> are different conceptual frameworks
- They drive organizations to different behaviors
  - Agile best when in equivalent of a “battle zone”
  - CMM®/CMMI<sup>sm</sup> best in defined process with defined task



# Agile & CMM® Process

- Jacobs (2004/03) used Agile to instantiate CMM®
  - Avoided tendency to over-process with multiple forms, plans, and procedures
  - Accelerated getting processes in place quickly
  - Concentrated on improving processes over time
- The Perez & Ambrose (2007/08) used Agile to instantiate CMMI<sup>sm</sup>
  - Moved from no formal process capability CMMI<sup>sm</sup> ML2
  - Prototyped processes
  - Defined processes 30% faster



# Agile & CMM® Process

- Glazer (2010/01) says Agile and CMMI<sup>sm</sup> complete each others' capabilities - lead to fast, affordable, visible, & long-term benefits
- Dutton (2010/01) writes that practices contained in the CMMI-DEV have migrated to enable Agile approaches
- SEI CMU/SEI-2010-TR-033 include guidance for Agile methods



# Agile & Waterfall

- Cockburn (2002/10 part 1) wrote Agile means prioritizing for maneuverability
  - Requirements
  - Technology, and
  - Understanding of the situation
- Cockburn (2002/11 part 2) wrote plan-driven can borrow from Agile
  - Streamlining
  - Improving Predictability
  - Hedging Bets
  - Lowering Costs





# Agile & Waterfall

- Willison (2004/04) described Army's Maneuver Control System (MCS Lite)
  - Software process struck balance between Agile & Waterfall
- Turner & Boehm (2003/12) say critical success factors are generally people factors
  - Staffing, culture, values, communication, & expectations management



# Agile & Waterfall

- Cockburn (2004/11) reported Agile scorned models & schedules for
  - Emphasized collaboration social tools
  - Used feedback tools, e.g., CM, automated testing
- Surdu & Parson (2006/4) say development method depends on the program, for OneSAF
  - Followed CMMI<sup>sm</sup> Level 5 (Waterfall) & individual interactions (Agile)
  - Focused on tacit knowledge & social collaboration in contrast with Waterfall's impersonal milestones



# Agile & Project Management

- Sleva (2002/10) noted Hill AFB used Agile for an auditable “unplanned work” approval tracking system - responded to change over following plan
- Mekelburg (2003/04) wrote traditional and agile approaches assume success is features delivered – but projects are successful only when they have met the stakeholders’ expectations
- McMahon (2004/05) discussed case study of conflicts where a company that used Waterfall collaborated with a company using Agile – needed lightweight project management framework



# Agile & Project Management

- McMahon (2005/05) presented a case for using key Agile practices along with recommended extensions on a broad range of projects - large and distributed
- Miller (2005/12) says Agile at Microsoft® uses personas, shadowing, and test thresholds.



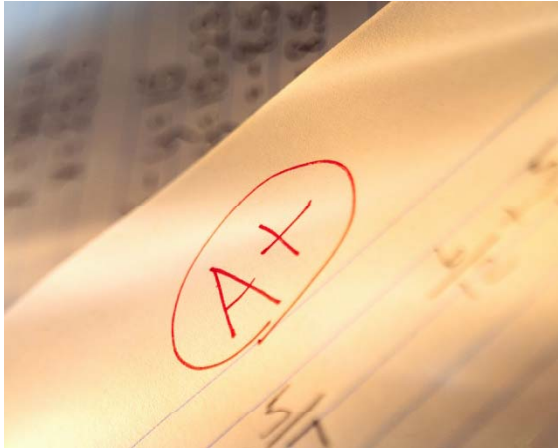
# Agile Performance & Metrics

- Reiffer (2002/6) examined Agile & software estimating
  - Concluded estimating software size and duration was feasible using Web objects
- Manzo (2002/10) provided some Agile performance statistics compared to projects conducted before adopting Agile
  - Showed cost per line of code & defect rates drastically reduced
  - Development velocity was significantly increased
- Oppertthausen (2003/9) discussed Agile requirements & implementation defects prevention & management
  - Concluded Agile focused on prevention and repair
  - Included both requirements and implementation defects



# Agile Performance & Metrics

- Cockburn (2006/02) describes governance metrics
  - True value, expected vs. actual progress
  - Used combinations of waterfall, incremental, concurrent, and Agile strategies
- Derby (2007/04) looks beyond Agile technical skills
  - Cites interactions & collaboration skills for peak performance
- McMahon (2008/05) says to question whether measuring the right things:
  - Are you seeing the results of your process improvement efforts?
  - If not, do you understand your real “as-is” process?



# Agile & Testing

- Daich (2003) discussed testing using combinatorial coverage & Orthogonal Array Testing Strategy (OATS)
  - Provided better integration test coverage, whether following CMM® or applying Agile testing methods
- Siddiqi (2008) studied Web Service (WS) standards & strategies for interoperability
  - Examined open source, service-oriented architecture (SOA), & Agile techniques
  - Allowed the team to more efficiently review and test
- Crowe & Cloutier (2009) Agile supported the DoD's Evolutionary Acquisition (EA) policy to rapidly provide operational capabilities to the warfighter
  - Used a rapid test approach to get feedback & resolve problems



# Agile & Other Domains

- McMahon (2006/05) says U.S. defense contracts experienced **systems engineering** breakdown
  - Agile is not a short-cut around systems engineering
- Turner (2007/04) says traditional **systems engineering** may not fit Agile systems
  - Inherent Waterfall orientation in system engineering
- Cockburn (2007/04) writes that Agile software engineering is similar to **agile manufacturing**
  - Analogy leverages lessons learned studies (100 yrs)





# Agile & Other Domains

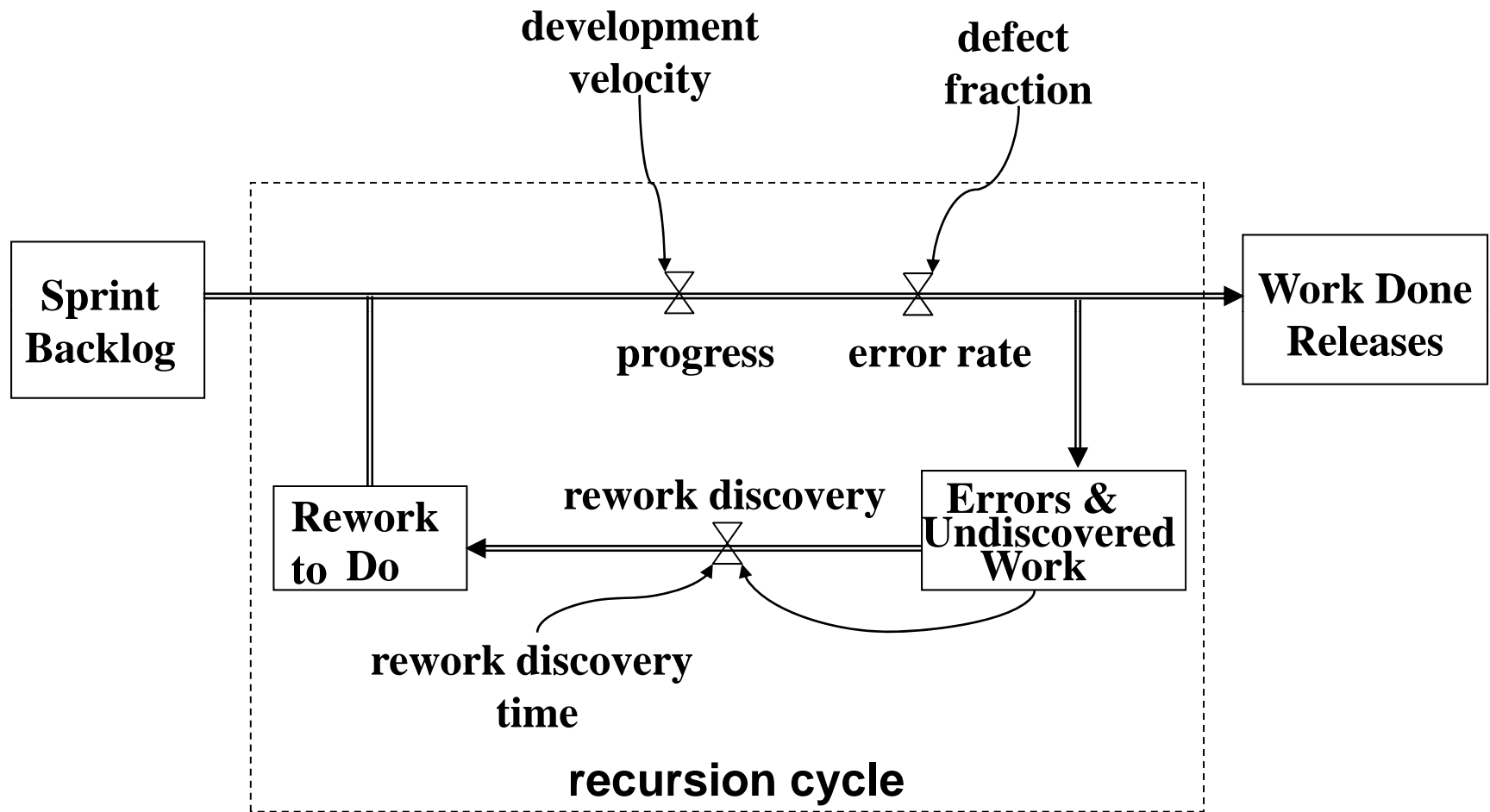
- Derby (2009/01) advises **evidence-based management**
  - Looks at what actually works rather than relying on common practices, or fads
- Brown, Nord & Ozkaya (2009/01) say Agile practices often overlook critical role of **architecture**
  - Architectural Agility allows architectural development to follow a “just-in-time” model
- McMahon (2009/02) applied Agile to address shortfalls under defense **acquisition** regulations, DoD/National Security Space Acquisition Policy 03-01.
  - Funding for Risks/Deferring Non-Key Items/Defining Readiness



# What's Next

- Key to Agile's future
  - Empirical feedback
  - Double-loop learning

# What's Next



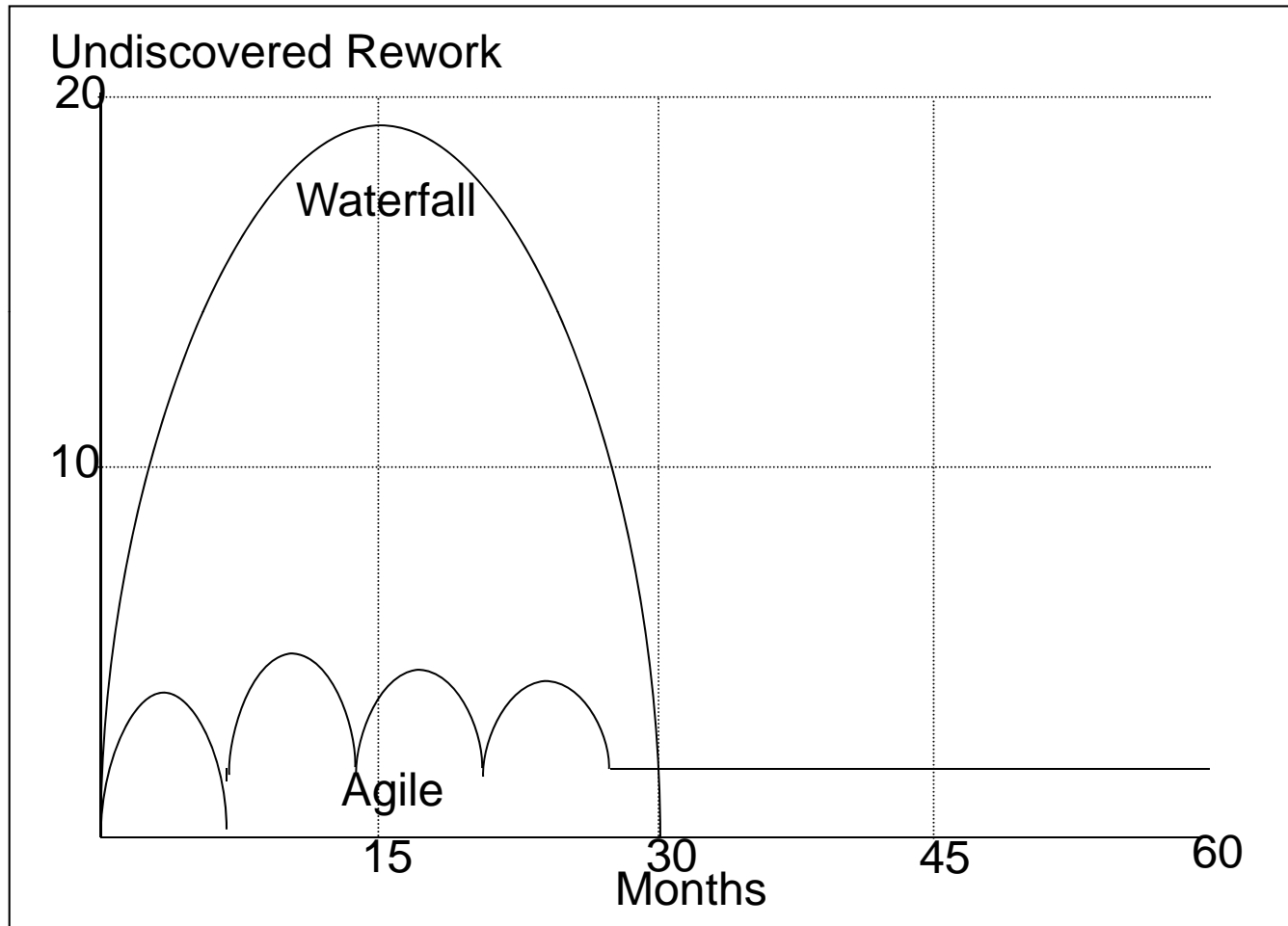
Conceptual Model (Adapted from: Lyneis & Ford, 2007, p161)

# What's Next

- Tignor (2009) explored agile project management relative to Lyneis & Ford (2007) generic rework structure
  - Reviewed 17 agile articles
  - Identified agile feedback
  - Allocated feedback to generic rework structure

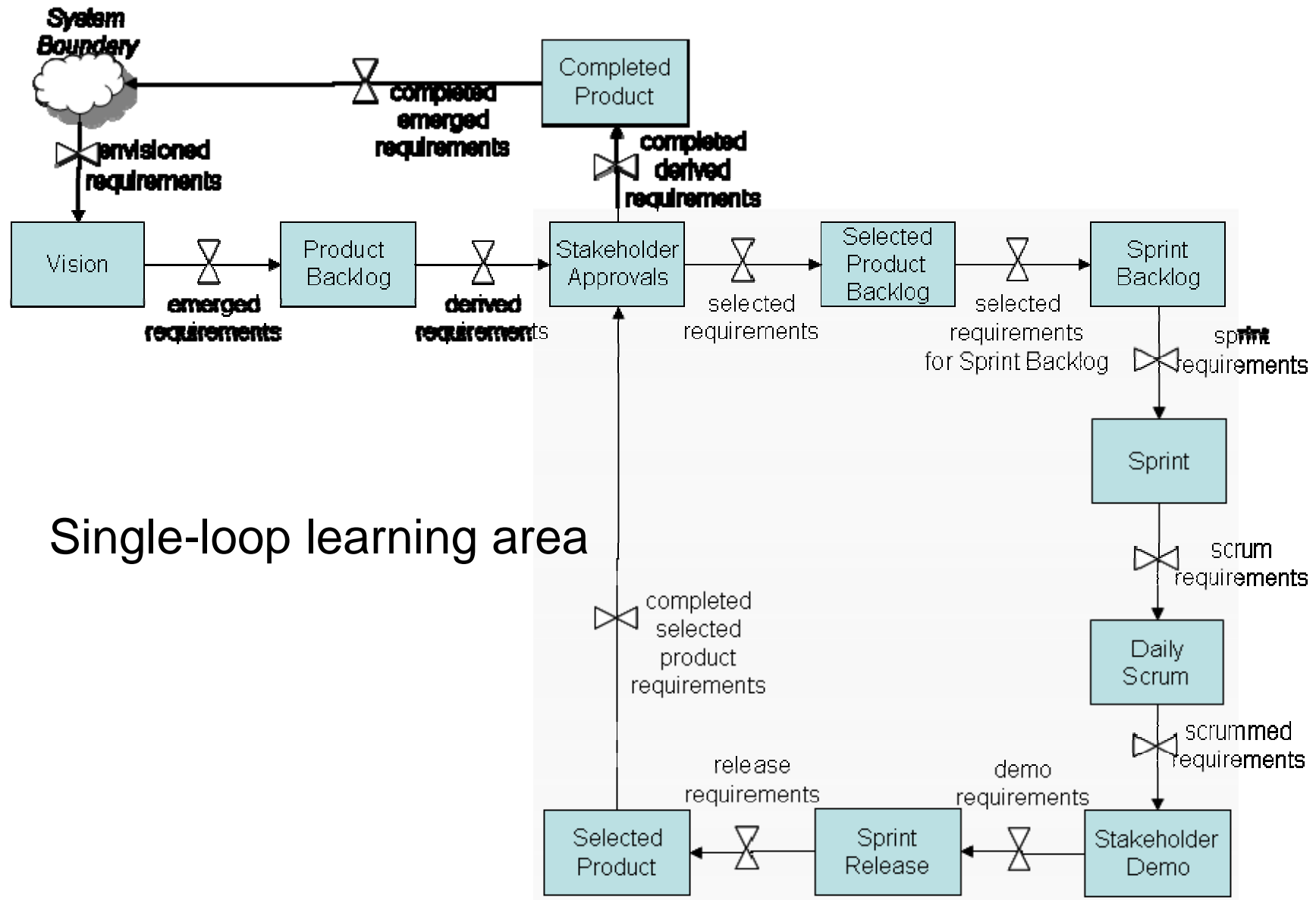
Rework Cycle	11
Original Work To Do	4
Rework To Do	2
Work Done	3
Undiscovered Work	2
Rework Discovery	3
Progress	2
Error Generation	1
Controlling Feedback	3
Ripple Effects	1
Knock-on Effects	2

# What's Next



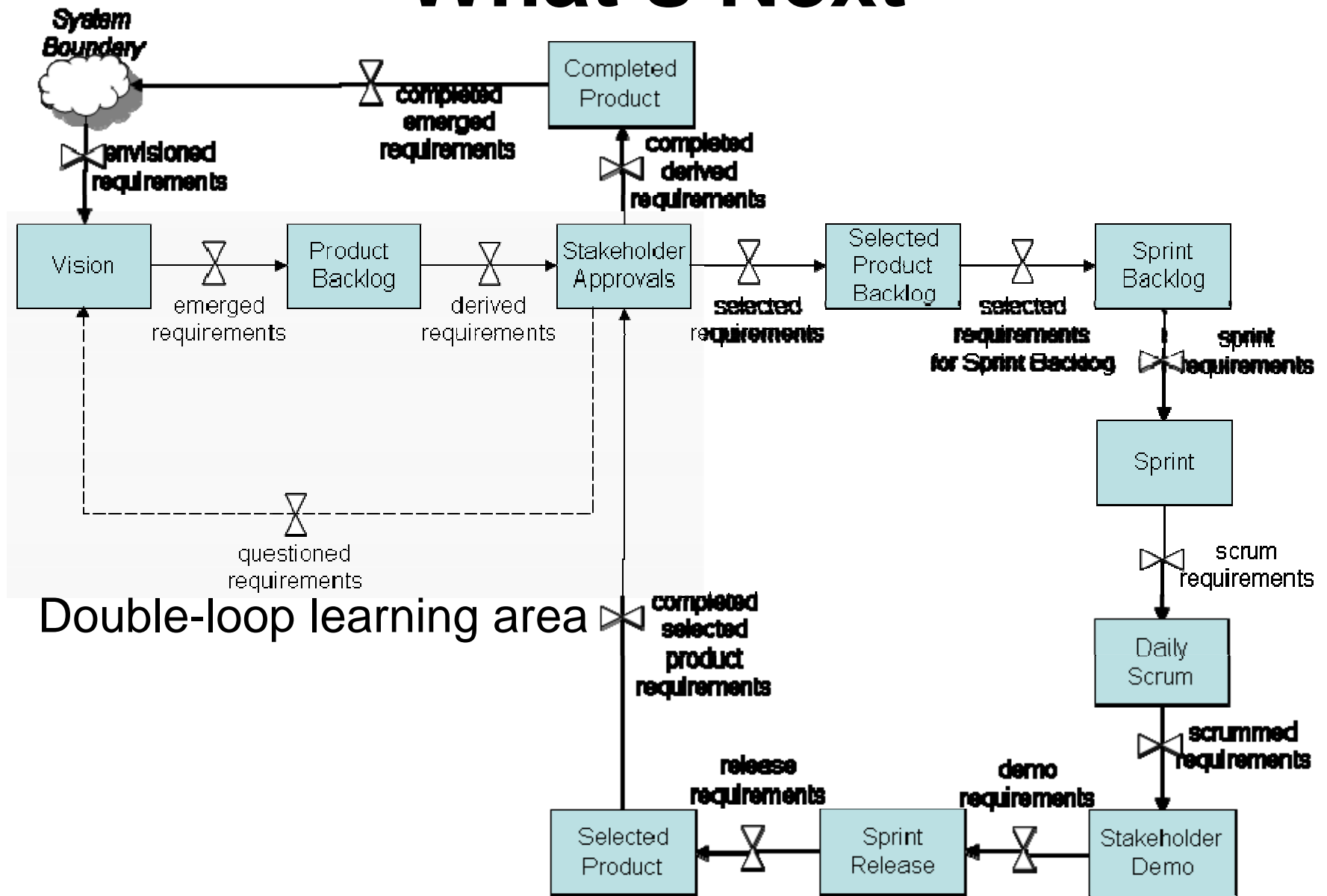
Undiscovered Rework adapted from Chichakly (2007), (Courtesy: Chichakly)

# What's Next



Adapting the Schwaber (2007) SCRUM graphic to a “rework” model

# What's Next



Adapting the Schwaber (2007) SCRUM graphic to a “rework” model

# Summary

- Agile solves complex problems based on its adaptive, iterative, and incremental properties
- Agile has the flexibility to cross over to other domains, e.g., CMM®, Waterfall, system engineer, ...
- Agile acknowledges that feedback plays a role, but feedback is generally overlooked as a detail
- The degree that feedback underpins Agile is significant upon closer inspection
  - Single-loop learning will help Agile manage its backlogs
  - Double-loop learning will help Agile manage its vision
- **Rugby: All Blacks 36 v England 12 Auckland, NZ (6/19/04)**



# Glossary

- AFB – Air Force Base
- CMMI-DEV – CMMI for Development
- CM – Configuration Management
- CMM® - Capability Maturity Model
- CMMI<sup>sm</sup> - Capability Maturity Model Integration
- EA - DoD's Evolutionary Acquisition policy
- HBR – Harvard Business Review
- MCS - Maneuver Control System
- OATS - Orthogonal Array Testing Strategy
- OneSAF - One Semi-Automated Forces
- SEI CMU – Software Engineering Institute Carnegie Mellon University
- SOA - Service-oriented Architecture
- WS - Web Service
- XP – Extreme Programming